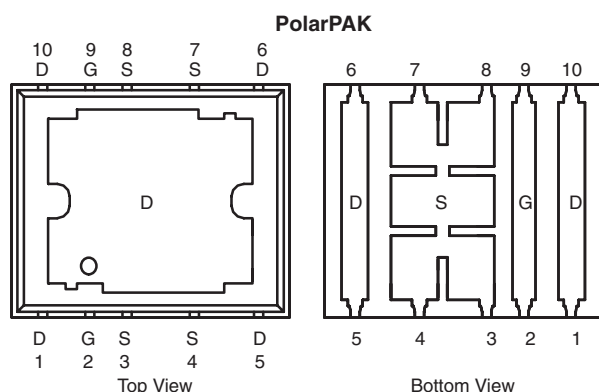


N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) ^e	I_D (A)		Q_g (Typ.)
		Silicon Limit	Package Limit	
30	0.0025 at $V_{GS} = 10$ V	164	60 ^a	55 nC
	0.0029 at $V_{GS} = 4.5$ V	152	60 ^a	

Package Drawing
www.vishay.com/doc?72945



Top surface is connected to pins 1, 5, 6, and 10

Ordering Information: SiE850DF-T1-E3 (Lead (Pb)-free)
SiE850DF-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

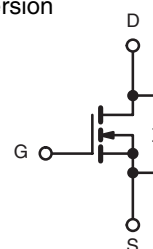
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Gen II Power MOSFET
- Ultra Low Thermal Resistance Using Top-Exposed PolarPAK[®] Package for Double-Sided Cooling
- Leadframe-Based New Encapsulated Package
 - Die Not Exposed
 - Same Layout Regardless of Die Size
- Low Q_{gd}/Q_{gs} Ratio Helps Prevent Shoot-Through
- 100 % R_g and UIS Tested
- Compliant to RoHS directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- VRM, POL
- DC/DC Conversion
- Server



N-Channel MOSFET
For Related Documents
www.vishay.com/ppg?73987

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	157 (Silicon Limit)
		$T_C = 70^\circ\text{C}$	60 ^a (Package Limit)
		$T_A = 25^\circ\text{C}$	60 ^a
		$T_A = 70^\circ\text{C}$	35 ^{b, c}
			28 ^{b, c}
Pulsed Drain Current	I_{DM}	80	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$	60 ^a
		$T_A = 25^\circ\text{C}$	4.3 ^{b, c}
Single Pulse Avalanche Current	I_{AS}	50	A
Avalanche Energy	E_{AS}	125	mJ
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	104
		$T_C = 70^\circ\text{C}$	66
		$T_A = 25^\circ\text{C}$	5.2 ^{b, c}
		$T_A = 70^\circ\text{C}$	3.3 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^{d, e}		260	$^\circ\text{C}$

Notes:

- Package limited is 60 A.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- See Solder Profile (www.vishay.com/doc?73257). The PolarPAK is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, b}	$t \leq 10$ s	R_{thJA}	20	24	°C/W
Maximum Junction-to-Case (Drain Top)	Steady State	R_{thJC} (Drain)	0.9	1.1	
Maximum Junction-to-Case (Source) ^{a, c}		R_{thJC} (Source)	2.7	3.3	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

b. Maximum under Steady State conditions is 68 °C/W.

c. Measured at source pin (on the side of the package).

SPECIFICATIONS $T_J = 25$ °C, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		30		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.6		1.8	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 12\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	25			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 20.8\text{ A}$		0.0021	0.0025	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 19.3\text{ A}$		0.0024	0.0029	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 20.8\text{ A}$		132		S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		8500		pF
Output Capacitance	C_{oss}			850		
Reverse Transfer Capacitance	C_{rss}			400		
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$		120	180	nC
		$V_{DS} = 15\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 20\text{ A}$		55	83	
Gate-Source Charge	Q_{gs}			16		
Gate-Drain Charge	Q_{gd}			6		
Gate Resistance	R_g	$f = 1\text{ MHz}$		0.65	1	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}$, $R_L = 1.5\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$		45	70	ns
Rise Time	t_r			15	25	
Turn-Off Delay Time	$t_{d(off)}$			150	225	
Fall Time	t_f			25	40	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}$, $R_L = 1.5\text{ }\Omega$ $I_D \cong 10\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$		20	30	
Rise Time	t_r			12	20	
Turn-Off Delay Time	$t_{d(off)}$			60	90	
Fall Time	t_f			10	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			60	A
Pulse Diode Forward Current ^a	I_{SM}				80	
Body Diode Voltage	V_{SD}	$I_S = 10\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$		45	70	ns
Body Diode Reverse Recovery Charge	Q_{rr}			50	75	nC
Reverse Recovery Fall Time	t_a			23		ns
Reverse Recovery Rise Time	t_b			22		

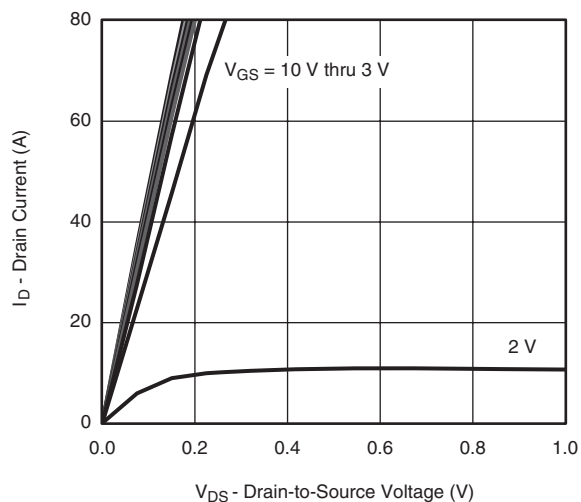
Notes:

a. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.

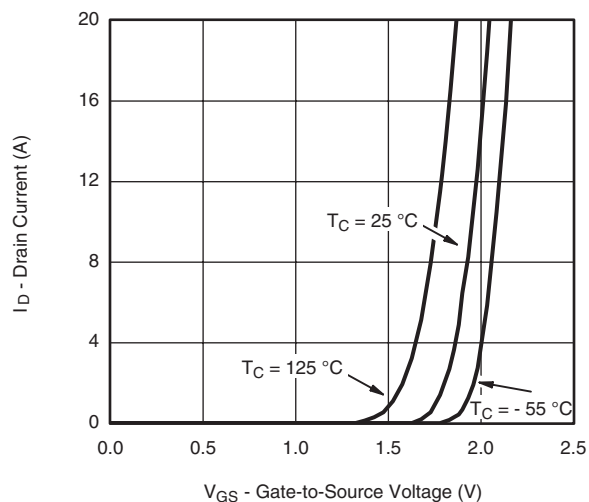
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

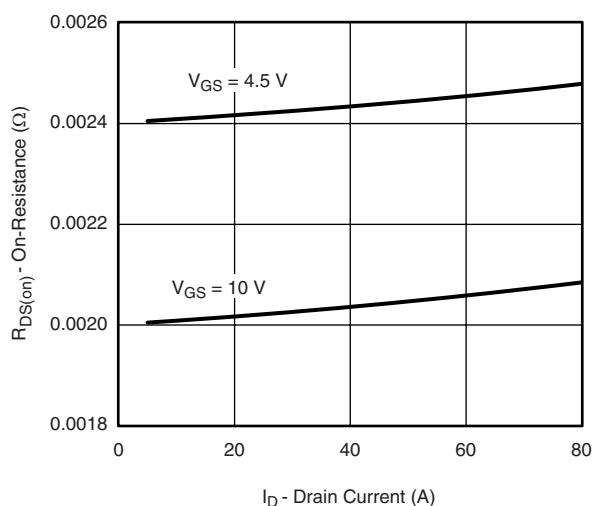
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



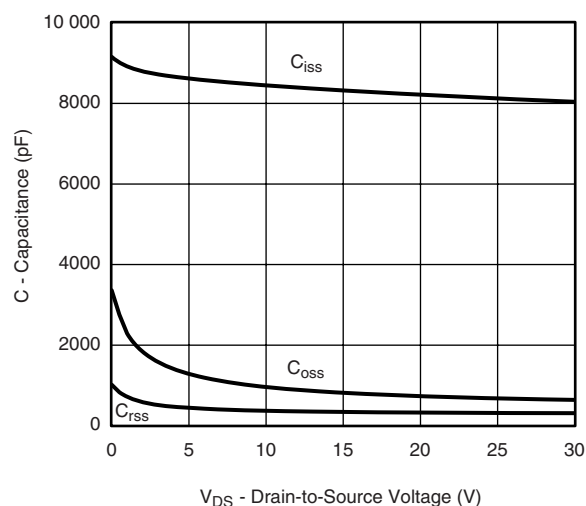
Output Characteristics



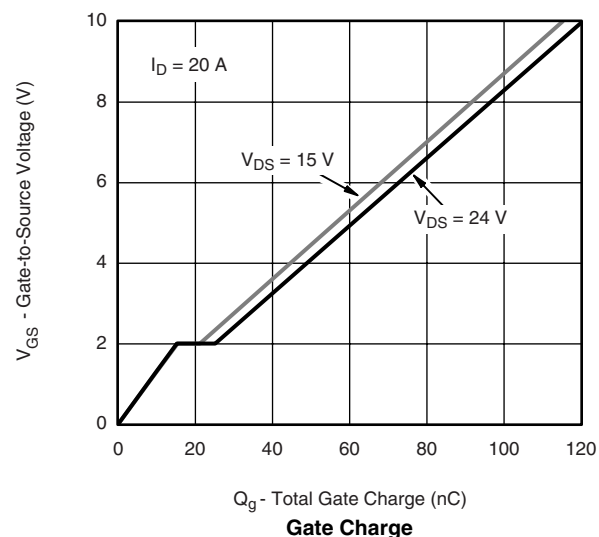
Transfer Characteristics



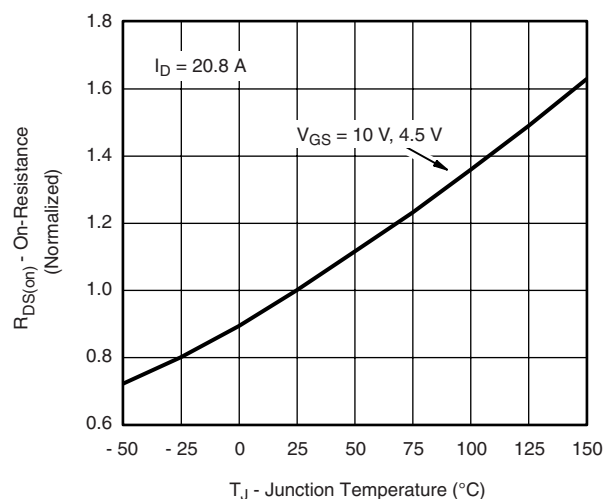
On-Resistance vs. Drain Current



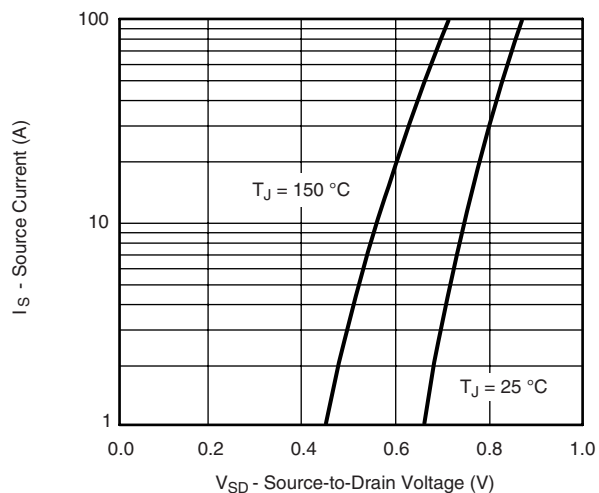
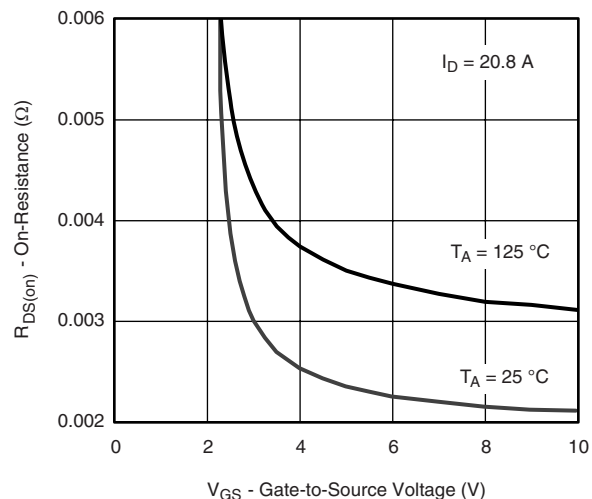
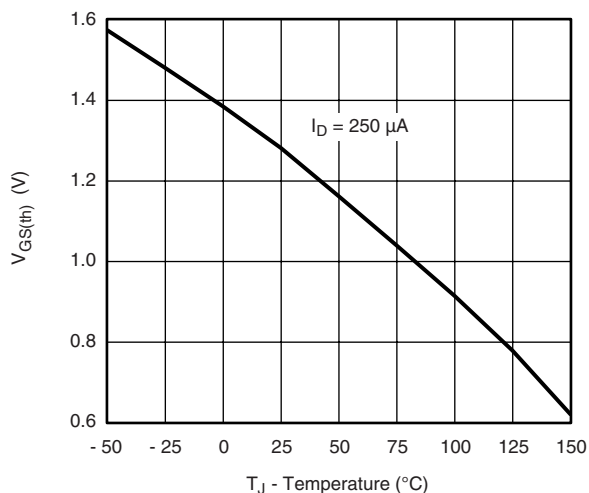
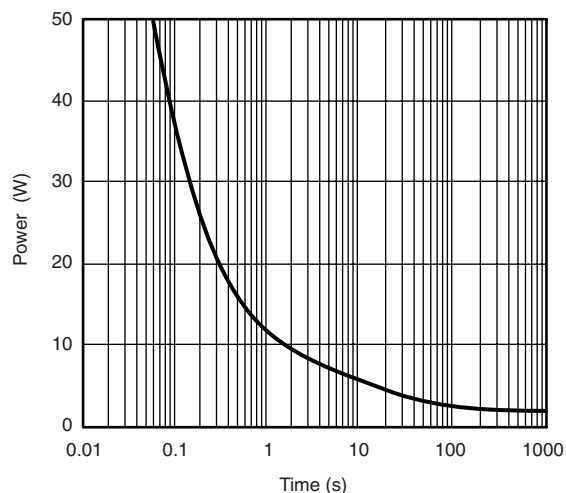
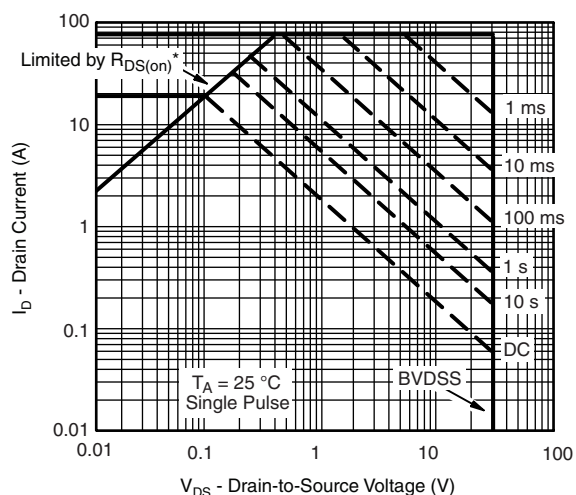
Capacitance



Gate Charge



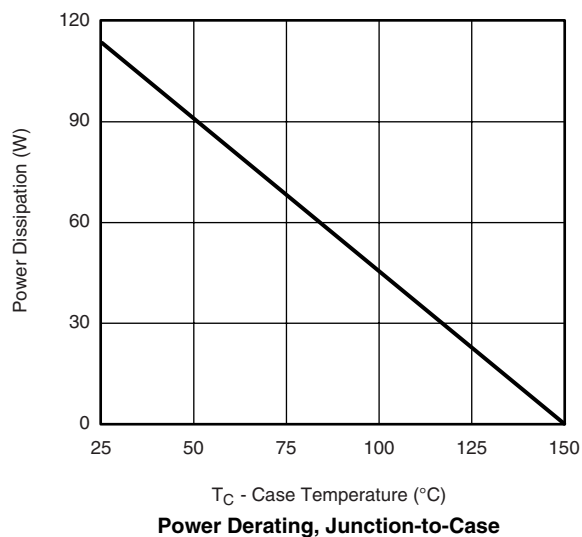
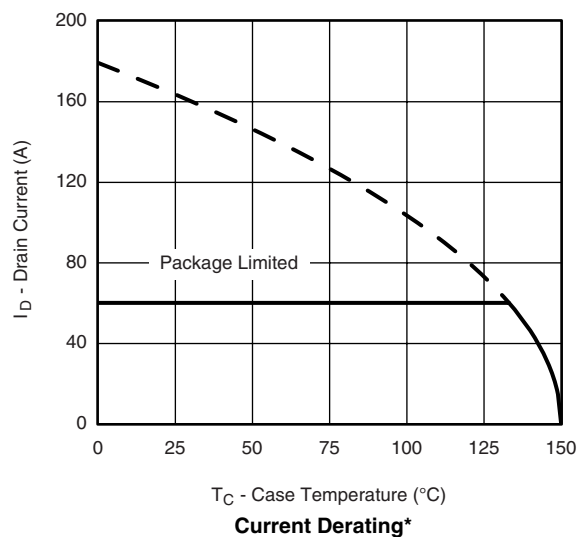
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power, Junction-to-Ambient


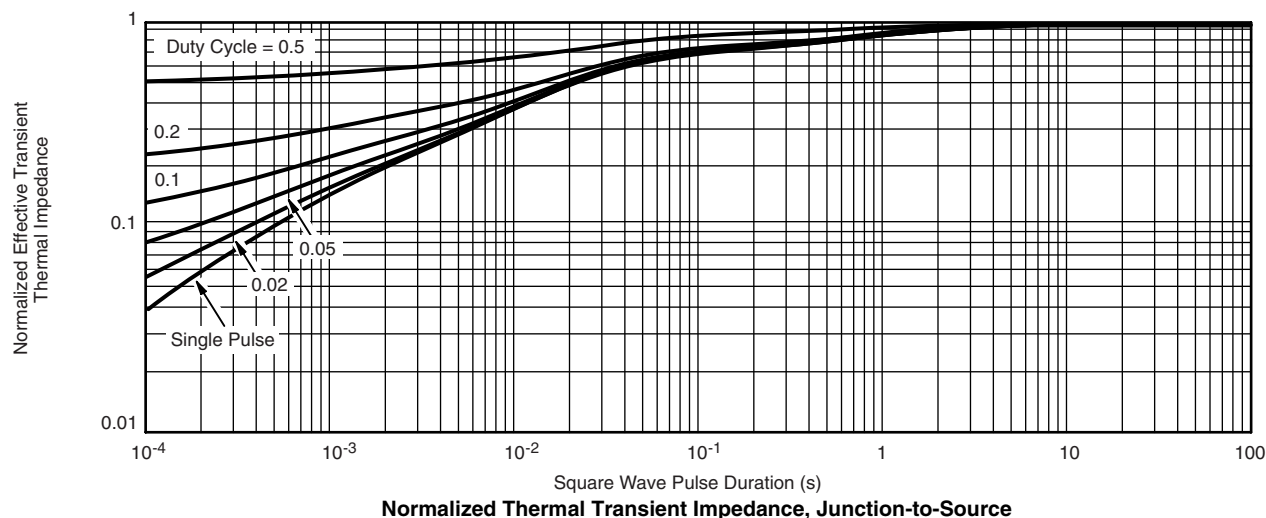
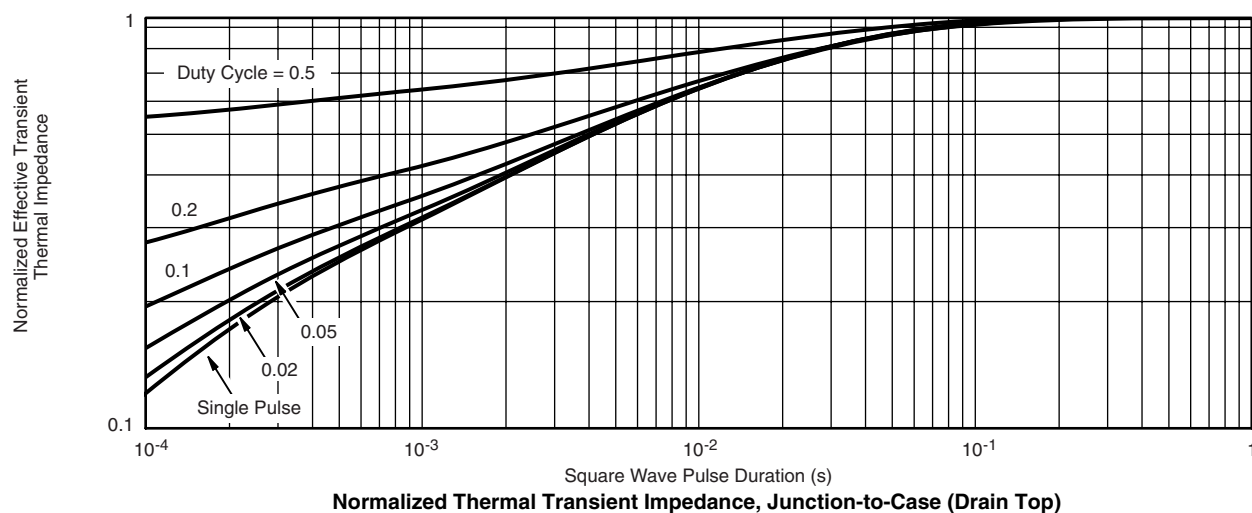
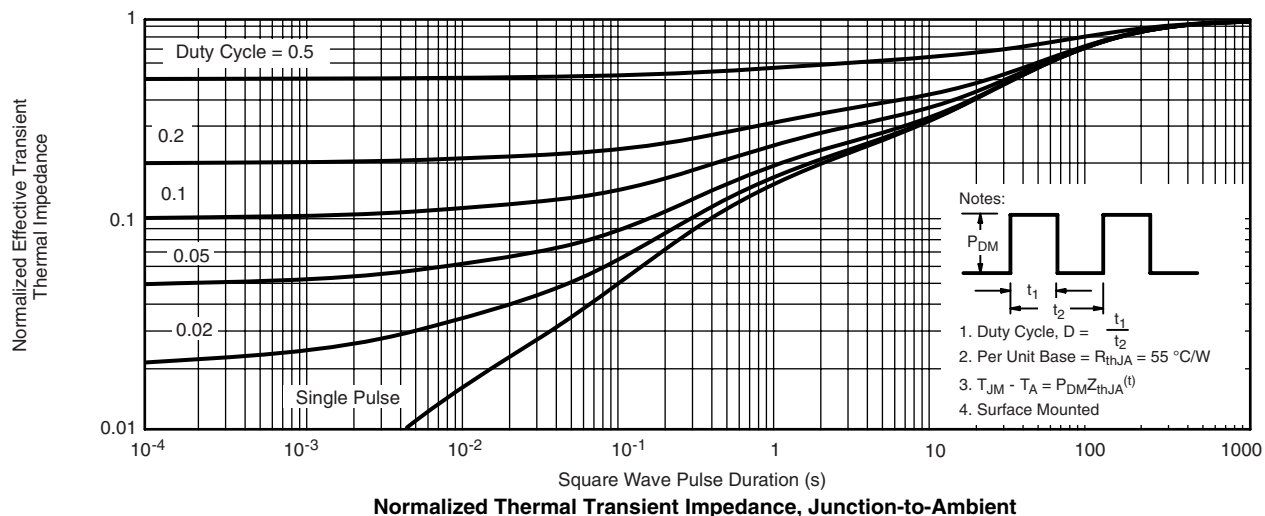
* $V_{DS} > \text{minimum } V_{GS} \text{ at which } R_{DS(on)} \text{ is specified}$

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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